Warp Drive Research: From Theory to Working Model

This document includes the theoretical background, quantitative estimates, and conceptual roadmap, along with the raw calculation tables generated during the research.

Subluminal Warp Shell (Positive Energy)

Even a 1% time dilation for a 5–10 m cabin requires planetary-scale mass (~10^25 to 10^26 kg).

Alcubierre-Type FTL Bubble

Negative energy needs are ~10^43–10^45 J. Casimir sources are ~10^-12 J, a gap of 55+ orders of magnitude.

Experimental Roadmap

Focus on designing stress-energy shells, lab interferometer detection of curvature, and resonant modulated systems.

Missing Pieces

1) Scalable negative energy; 2) 10^25–10^30 J energy breakthroughs; 3) Stable engineering methods.

Conclusion

Warp drive is GR-permitted but energy-prohibitive. The next step: detect artificial curvature in lab-scale experiments.

Appendix: Calculation Tables

Table 1. Mass needed for ~1% time dilation inside a spherical shell

Shell radius (m)	Mass (no 1/2 factor) [kg]	Mass (with 1/2 factor) [kg]
1	1.35e25	6.74e24
5	6.74e25	3.37e25
10	1.35e26	6.74e25
50	6.74e26	3.37e26

Table 2. Casimir negative energy estimates

Plate area (m^2)	Gap (nm)	Energy density (J/m^3)	Total energy (J)
1.0	100	-4.3e-07	-4.3e-14

1.0	10	-4.3e-04	-4.3e-12
10.0	100	-4.3e-07	-4.3e-13

Table 3. Toy warp-bubble energy scaling (illustrative)

Radius (m)	Wall thickness (m)	v/c	Negative energy (J)
10	1	0.1	6e43
10	0.1	0.1	6e44
100	1	0.1	6e45
10	1	0.5	1.5e45